MITSUBISHI MITSUBISHI MATERIALS TOOLS NEWS
B073G YOUR GLOBAL CRAFTSMAN STUDIO

DLC Coated End Mill

DLC-2MB

"DLC coated ball nose end mill" Newly added to DLC coated end mill series.

High performance is realized in milling of non-ferrous materials such as Al-alloy, graphite and plastic.
Abundant lineup of minimum R0.1mm.

DLC Coated End Mill

DLC-2MB

2 flute DLC coated ball nose end mill (M)

Features

"DLC coated ball nose end mill" Newly added to DLC coated end mill series.

Due to applying DLC coating with superior anti-adhesion, high performance is realized in milling of non-ferrous materials.

Abundant sizes at small radius of ball nose standards.

Due to abundant lineup of 19 size in total, diverse machining is possible.
High performance is realized in milling of non-ferrous materials such as Al-alloy, graphite, plastic and FRP.

Applying for new developed DLC coating. The hardness of film such as diamond is realized with high adhesion.

Adhesion used to be the weak point of DLC coating. We developed original DLC coating with obtains superior adhesion level (Co-developed with ShinMaywa Co.).

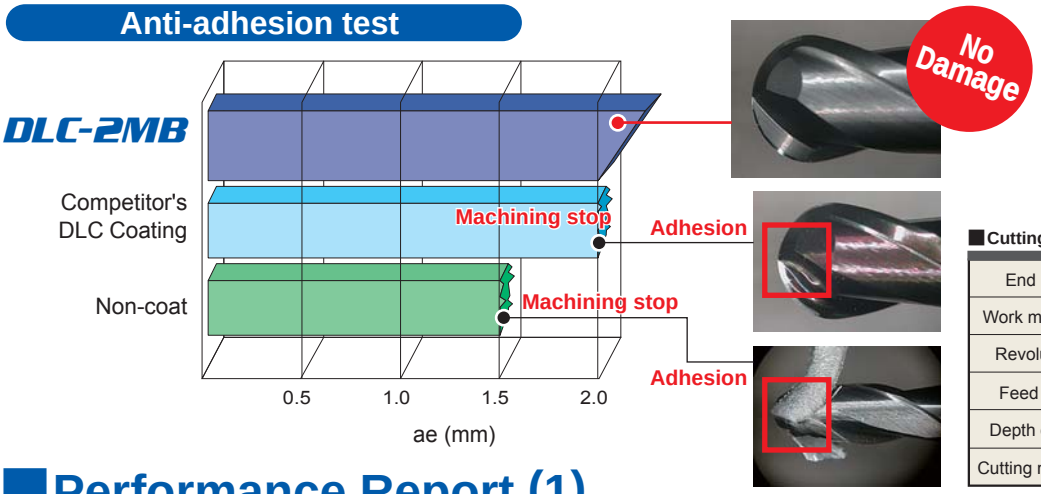
Close hardness Diamond

Characteristic of DLC coating

	DLC	Competitor's DLC	Diamond	TiN
Hardness (HV)	6,000—7,000	1,000—7,000	7,000—10,000	2,000
Friction coefficient	0.1	0.1	0.4	0.4

Machining Example

Anti-adhesion test



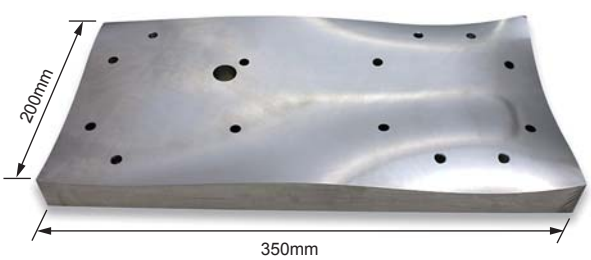
Cutting conditions

End mill	DLC-2MB R3
Work material	A5052
Revolution	20,000min^{-1}
Feed rate	6,000mm/min (0.15mm/tooth)
Depth of cut	ap 2mm
Cutting method	Air blow

Performance Report (1)

Machining for Al-alloy (A5052)

After 6 hours machining,
No Damage.



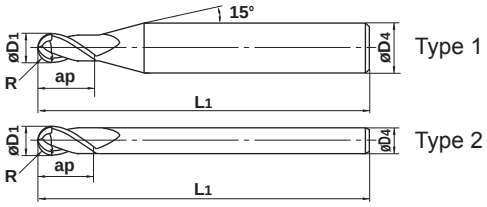
Cutting conditions

End mill	DLC-2MB R5
Work material	A5052
Revolution	12,000min^{-1}
Feed rate	2,200mm/min (0.09mm/tooth)
Depth of cut	ap 0.2mm pf 0.2mm
Cutting method	Emulsion

DLC-2MB

Ball Nose, Medium, 2 flute, For Non-ferrous material

R		D1	
R≤6	±0.01	D1≤6	0 − -0.020
6<R	±0.02	6<D1	0 − -0.030



● Due to applying DLC coating with superior anti-adhesion, high performance is realized in milling of non-ferrous materials such as Al-alloy, FRP, Copper-alloy and graphite.

Unit : mm

Order Number	Radius of ball nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
DLC2MBR0010	0.1	0.2	0.4	40	4	2	○	1
R0015	0.15	0.3	0.6	40	4	2	○	1
R0020	0.2	0.4	0.8	40	4	2	○	1
R0025	0.25	0.5	1	40	4	2	○	1
R0030	0.3	0.6	1.2	40	4	2	●	1
R0040	0.4	0.8	1.6	40	4	2	●	1
R0050	0.5	1	2.5	40	4	2	●	1
R0075	0.75	1.5	4	40	4	2	●	1
R0100	1	2	6	60	6	2	●	1
R0125	1.25	2.5	6	60	6	2	●	1
R0150	1.5	3	8	70	6	2	●	1
R0200	2	4	8	70	6	2	●	1
R0250	2.5	5	12	80	6	2	●	1
R0300	3	6	12	80	6	2	●	2
R0400	4	8	14	90	8	2	●	2
R0500	5	10	18	100	10	2	●	2
R0600	6	12	22	110	12	2	●	2
R0800	8	16	30	140	16	2	●	2
R1000	10	20	38	160	20	2	●	2

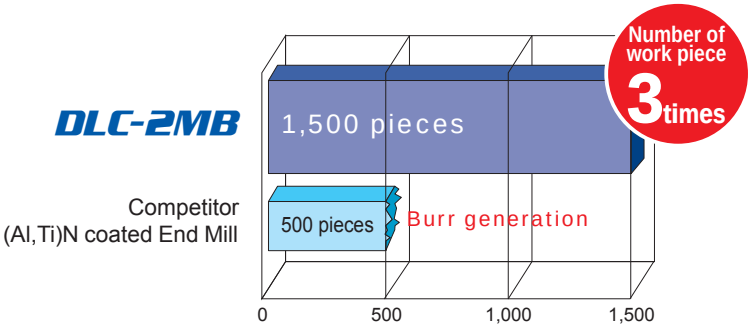
● : Inventory maintained. ○ : To be on sale.

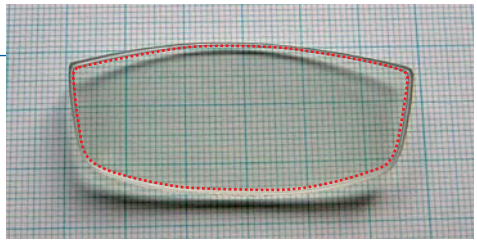
Performance Report (2)

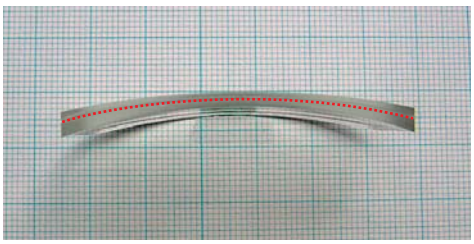
Ply-carbonate

Compare with (Al,Ti)N coated end mill,

Long tool life without burr.







Machining point

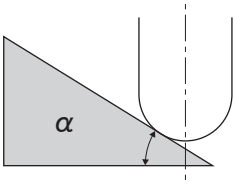
End mill	DLC-2MB R0.3
Work material	Ply-carbonate
Revolution	12,000min^{-1}
Feed rate	900mm/min (0.03mm/tooth)
Depth of cut	ap 0.1mm
Cutting method	Dry

DLC COATED END MILL

DLC-2MB

Ball Nose, Medium, 2 flute, For Non-ferrous material

Work material	Aluminium alloy A7075				Cast aluminium AC4B			
R (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R 0.1	40,000	350	40,000	260	40,000	280	40,000	210
R 0.15	40,000	480	40,000	360	40,000	380	40,000	290
R 0.2	40,000	600	40,000	450	40,000	480	40,000	360
R 0.25	40,000	800	40,000	600	40,000	640	40,000	480
R 0.3	40,000	1,000	40,000	750	40,000	800	40,000	600
R 0.4	40,000	1,500	40,000	1,100	40,000	1,200	40,000	880
R 0.5	40,000	2,000	40,000	1,500	40,000	1,600	40,000	1,200
R 0.75	40,000	2,200	40,000	1,600	40,000	1,800	40,000	1,300
R 1	40,000	2,800	40,000	2,200	40,000	2,200	32,000	1,400
R 1.25	40,000	3,200	38,000	2,200	32,000	2,000	30,000	1,400
R 1.5	40,000	4,000	32,000	2,600	32,000	2,600	26,000	1,700
R 2	30,000	4,200	24,000	2,800	24,000	2,700	19,000	1,800
R 2.5	24,000	4,400	19,000	2,800	19,000	2,800	15,000	1,800
R 3	20,000	4,000	16,000	2,800	16,000	2,600	13,000	1,800
R 4	15,000	3,600	12,000	2,400	12,000	2,300	9,600	1,500
R 5	12,000	3,600	9,500	2,000	9,600	2,300	7,600	1,300
R 6	10,000	3,200	8,000	2,200	8,000	2,000	6,400	1,400
R 8	7,500	2,800	6,000	1,800	6,000	1,800	4,800	1,200
R10	6,000	2,500	4,800	1,600	4,800	1,600	3,800	1,000
Depth of cut	≤0.2R(R<0.5) ≤0.4R(R≥0.5) ≤0.2R R:Radius							



1) α is the inclination of the machined surface.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
3) If the depth of cut is shallow, the revolution and feed rate can be increased.
4) For milling of GFRP, please reduce the revolution and feed rate to 50% of the table figure of aluminium alloy.
   Please adjust the depth of cut according to the quality of GFRP. (GFRP=Glass Fibre Reinforced Plastic)
5) Water-soluble cutting fluid is recommended.

For Your Safety
●Cutting flutes and chips have sharp edges. Never touch these with your bare hands. ●Use these products within their recommended range of conditions, and make sure to replace tools before excessive wear occurs. ●Lathes may scatter hot chips or eject long chips. Make sure to use protective equipment such as safety cover and protective eye wear to prevent injury. ●Always take appropriate fire protection measures if non-water-soluble cutting fluid is used. ●If the tool is to be rotated for use, always make sure to perform a test run to check for shaking, vibrations, and unusual sounds.

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(Tools specifications subject to change without notice.)

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